

## Section 5. Altitude Assignment and Verification

### Altitude Assignment

#### 4-5-1. VERTICAL SEPARATION MINIMA

Separate instrument flight rules (IFR) aircraft using the following minima between altitudes:

- a. Up to and including FL 290- 1,000 feet.
- b. Above FL 290- 2,000 feet, except:
  1. In oceanic airspace, above FL 450 between a supersonic and any other aircraft- 4,000 feet.
  2. Above FL 600 between military aircraft- 5,000 feet.
  3. Apply 1,000 feet between approved aircraft if:
    - (a) Operating within airspace and altitude(s) designated for reduced vertical separation minimum (RVSM) or,
    - (b) Operating within RVSM transition airspace and designated altitude(s) if:
      - (1) En route to/from RVSM designated airspace; or,
      - (2) Within the Anchorage FIR.

#### NOTE-

1. Oceanic separation procedures are supplemented in Chapter 8; Section 7, Section 8, Section 9, and Section 10.

2. RVSM and RVSM transition airspace is designated in ICAO Regional Supplementary Document, Doc. 7030.4, and via International NOTAM.

#### REFERENCE-

FAAO 7110.65, Vertical Application, Para 5-5-5.

FAAO 7110.65, Application, Para 6-6-1.

FAAO 7110.65, Military Operations Above FL 600, Para 9-3-11.

#### 4-5-2. FLIGHT DIRECTION

Clear aircraft at altitudes according to the TBL 4-5-1.

Aircraft Operating	On course degrees magnetic	Assign	Examples
Below 3,000 feet above surface	Any course	Any altitude	
Below FL 290	0 through 179	Odd cardinal altitude or flight levels at intervals of 2,000 feet	3,000 5,000, FL 250, FL 270
	180 through 359	Even cardinal altitude or flight levels at intervals of 2,000 feet	4,000, 6000, FL 240, FL 260
At or above FL 290	0 through 179	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 290	FL 290, FL 330, FL 370
	180 through 359	Odd cardinal flight levels at intervals of 4,000 feet beginning with FL 310	FL 310, FL 350, FL 390
One way routes (except in composite systems)	Any course	Any cardinal altitude or flight level below FL 290 or any odd cardinal flight level at or above FL 290	FL 270, FL 280, FL 310, FL 330
Within an ALTRV	Any course	Any altitude or flight level	
In transition to/from or within Oceanic airspace where composite separation is authorized	Any course	Any odd or even cardinal flight level including those above FL 290	FL 280, FL 290, FL 300, FL 310, FL 320, FL 330, FL 340
In aerial refueling tracks and anchors	Any course	Altitude blocks as requested. Any altitude or flight level	050B080, FL 1 80B220, FL 280B310
Aircraft within RVSM or RVSM transition airspace	Any course	Any designated cardinal altitude	FL 330, FL 340, FL 350, FL 360

TBL 4-5-1

#### NOTE-

Oceanic separation procedures are supplemented in Chapter 8; Section 7, Section 8, Section 9, and Section 10.

**REFERENCE-**

FAAO 7110.65, *Exceptions, Para 4-5-3.*  
 FAAO 7110.65, *Altitude Assignments, Para 7-7-5.*  
 FAAO 7110.65, *Separation Minima, Para 9-4-2.*

**4-5-3. EXCEPTIONS**

When traffic, meteorological conditions, or aircraft operational limitations prevent assignment of altitudes prescribed in para 4-5-2, Flight Direction, assign any cardinal altitude or flight level below FL 290 or any odd cardinal flight level at or above FL 290 without regard to direction of flight as follows:

**NOTE-**

See para 2-3-9, *Control Symbolology, for control abbreviations and symbols to be used in conjunction with this paragraph.*

a. For traffic conditions, take this action only if one of the following conditions exists:

1. Aircraft remain within a facility's area and prior approval is obtained from other affected positions or sectors or the operations are covered in a Facility Directive.

2. Aircraft will proceed beyond the facility's area and specific operations and procedures permitting random altitude assignment are covered in a letter of agreement between the appropriate facilities.

**NOTE-**

*Those en route facilities using host software that provides capability for passing interim altitude shall include the specific operations and procedures for use of this procedure in a letter of agreement between the appropriate facilities.*

b. Military aircraft are operating on random routes and prior approval is obtained from the facility concerned.

c. For meteorological conditions, take this action only if you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

d. For aircraft operational limitations, take this action only if the pilot informs you the available appropriate altitude exceeds the operational limitations of his/her aircraft and only after you obtain prior approval from other affected positions or sectors within your facility and, if necessary, from the adjacent facility concerned.

e. For mission requirements, take this action only when the aircraft is operating on an MTR.

**REFERENCE-**

FAAO 7110.65, *Altitude Assignments, Para 7-7-5.*  
 FAAO 7110.65, *Separation Minima, Para 9-4-2.*

f. For facilities utilizing URET CCLD, take this action without coordination when URET CCLD functionalities determine that coordination is not required.

**4-5-4. LOWEST USABLE FLIGHT LEVEL**

If a change in atmospheric pressure affects a usable flight level in your area of jurisdiction, use TBL 4-5-2 to determine the lowest usable flight level to clear aircraft at or above 18,000 feet MSL.

**Lowest Usable FL**

Altimeter Setting	Lowest Usable FL
29.92" or higher	180
29.91" to 28.92"	190
28.91" to 27.92"	200

TBL 4-5-2

**REFERENCE-**

FAAO 7110.65, *Separation Minima, Para 9-4-2.*

**4-5-5. ADJUSTED MINIMUM FLIGHT LEVEL**

When the prescribed minimum altitude for IFR operations is at or above 18,000 feet MSL and the atmospheric pressure is less than 29.92", add the appropriate adjustment factor from TBL 4-5-3 to the flight level equivalent of the minimum altitude in feet to determine the adjusted minimum flight level.

**Minimum FL Adjustment**

Altimeter Setting	Adjustment Factor
29.92" or higher	None
29.91" to 29.42"	500 feet
29.41" to 28.92"	1,000 feet
28.91" to 28.42"	1,500 feet
28.41" to 27.92"	2,000 feet

TBL 4-5-3

**4-5-6. MINIMUM EN ROUTE ALTITUDES**

Except as provided in subparas a and b below, assign altitudes at or above the MEA for the route segment being flown. When a lower MEA for subsequent segments of the route is applicable, issue the lower MEA only after the aircraft is over or past the Fix/NAVAID beyond which the lower MEA applies unless a crossing restriction at or above the higher MEA is issued.

a. An aircraft may be cleared below the MEA but not below the MOCA for the route segment being flown if the altitude assigned is at least 300 feet above the floor of controlled airspace and one of the following conditions are met:

**NOTE-**

*Controllers must be aware that in the event of radio communications failure, a pilot will climb to the MEA for the route segment being flown.*

1. Nonradar procedures are used only within 22 miles of a VOR, VORTAC, or TACAN.

2. Radar procedures are used only when an operational advantage is realized and the following actions are taken:

(a) Radar navigational guidance is provided until the aircraft is within 22 miles of the NAVAID, and

(b) Lost communications instructions are issued.

b. An aircraft may be cleared to operate on jet routes below the MEA (but not below the prescribed minimum altitude for IFR operations) or above the maximum authorized altitude if, in either case, radar service is provided.

**NOTE-**

*Minimum en route and maximum authorized altitudes for certain jet route segments have been established above the floor of the jet route structure due to limitations on navigational signal coverage.*

c. Where a higher altitude is required because of an MEA, the aircraft shall be cleared to begin climb to the higher MEA as follows:

1. If no MCA is specified, prior to or immediately after passing the fix where the higher MEA is designated. (See FIG 4-5-1.)

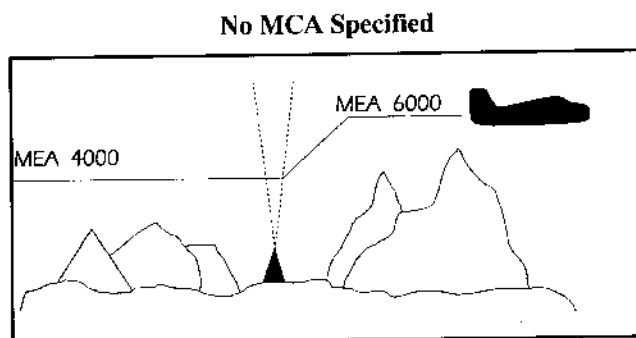


FIG 4-5-1

2. If a MCA is specified, prior to the fix so as to cross the fix at or above the MCA. (See FIG 4-5-2.)

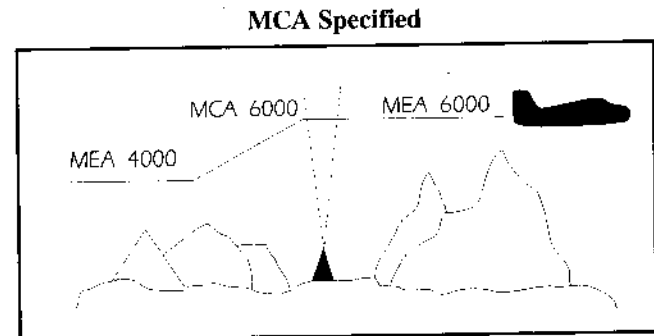


FIG 4-5-2

d. Where MEA's have not been established, clear an aircraft at or above the minimum altitude for IFR operations prescribed by 14 CFR Section 91.177.

**REFERENCE-**

FAAO 7110.65, IFR-VFR and VFR-IFR Flights, Para 4-2-8.

FAAO 7110.65, Route Use, Para 4-4-1.

FAAO 7110.65, Chapter 5, Section 6, Application, Para 5-6-1.

FAAO 7110.65, Altitude Assignments, Para 7-7-5.

#### 4-5-7. ALTITUDE INFORMATION

Issue altitude instructions as follows:

**REFERENCE-**

FAAO 7110.65, Clearance Items, Para 4-2-1.

a. Altitude to maintain or cruise. When issuing cruise in conjunction with an airport clearance limit and an unpublished route will be used, issue an appropriate crossing altitude to ensure terrain clearance until the aircraft reaches a fix, point, or route where the altitude information is available to the pilot. When issuing a cruise clearance to an airport which does not have a published instrument approach, a cruise clearance without a crossing restriction may be issued.

**PHRASEOLOGY-**

MAINTAIN/CRUISE (altitude). MAINTAIN (altitude)  
UNTIL (time, fix, waypoint),

or

(number of miles or minutes) MILES/MINUTES PAST (fix, waypoint).

CROSS (fix, point, waypoint),

or

INTERCEPT (route) AT OR ABOVE (altitude), CRUISE (altitude).

**NOTE-**

1. The crossing altitude must assure IFR obstruction clearance to the point where the aircraft is established on a segment of a published route or instrument approach procedure.

2. When an aircraft is issued a cruise clearance to an airport which does not have a published instrument approach procedure, it is not possible to satisfy the requirement for a crossing altitude that will ensure terrain clearance until the aircraft reaches a fix, point, or route where altitude information is available to the pilot. Under those conditions, a cruise clearance without a crossing restriction authorizes a pilot to determine the minimum IFR altitude as prescribed in 14 CFR Section 91.177 and descend to it at pilot discretion if it is lower than the altitude specified in the cruise clearance.

b. Instructions to climb or descend including restrictions, as required. Specify a time restriction reference the UTC clock reading with a time check. If you are relaying through an authorized communications provider, such as ARINC, FSS, etc., advise the radio operator to issue the current time to the aircraft when the clearance is relayed.

**EXAMPLE-**

1. "United Four Seventeen, climb to reach one three thousand at two two one five."

"Time two two one one and one-quarter."

The pilot is expected to be level at 13,000 feet at 2215 UTC.

2. Through Relay—"Speedbird Five, climb to reach flight level three-five zero at one-two-one-five, time" (Issue a time check).

**REFERENCE-**

FAAO 7110.65, Word Meanings, Para 1-2-1.

FAAO 7110.65, Numbers Usage, Para 2-4-17.

**PHRASEOLOGY-**

CLIMB/DESCEND AND MAINTAIN (altitude).

If required,

**AFTER PASSING** (fix, waypoint),

or

AT (time) (time in hours, minutes, and nearest quarter minute).

CLIMB/DESCEND TO REACH (altitude)

AT (time (issue time check) or fix, waypoint),

or

AT (time). CLIMB/DESCEND AND MAINTAIN (altitude)  
WHEN ESTABLISHED AT LEAST (number of miles or minutes) MILES/MINUTES PAST (fix, waypoint) ON THE

(NAVAID) (specified) RADIAL.

CLIMB/DESCEND TO REACH (altitude) AT (time or fix, waypoint),

or

A POINT (number of miles) MILES (direction) OF (name of DME NAVAID),

or

MAINTAIN (altitude) UNTIL (time (issue time check), fix, waypoint), THEN CLIMB/DESCEND AND MAINTAIN (altitude).

Through relay:

CLIMB TO REACH (altitude) AT (time) (issue a time check).

c. Specified altitude over a specified fix, waypoint.

**PHRASEOLOGY-**

CROSS (fix, waypoint) AT (altitude).

CROSS (fix, waypoint) AT OR ABOVE/BELOW (altitude).

d. A specified altitude over a specified fix for that portion of a descent clearance where descent at pilot's discretion is permissible. At any other time it is practicable, authorize climb/descent at pilot's discretion.

**PHRASEOLOGY-**

CLIMB/DESCEND AT PILOT'S DISCRETION.

**EXAMPLE-**

"United Four Seventeen, descend and maintain six thousand."

**NOTE-**

The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified in the AIM, para 4-4-9, Adherence to Clearance, until reaching the assigned altitude of 6,000 feet.

**EXAMPLE-**

"United Four Seventeen, descend at pilot's discretion, maintain six thousand."

**NOTE-**

The pilot is authorized to conduct descent within the context of the term "at pilot's discretion" as described in the AIM.

**EXAMPLE-**

"United Four Seventeen cross Lakeview V-O-R at or above flight level two zero zero, descend and maintain six thousand."

**NOTE-**

The pilot is authorized to conduct descent "at pilot's discretion" until reaching Lakeview VOR. The pilot must comply with the clearance provision to cross the Lakeview VOR at or above FL 200, and after passing Lakeview VOR, the pilot is expected to descend at the rates specified in the AIM until reaching the assigned altitude of 6,000 feet.

**EXAMPLE-**

"United Four Seventeen, cross Lakeview V-O-R at and maintain six thousand."

**NOTE-**

The pilot is authorized to conduct descent "at pilot's discretion," but must comply with the clearance provision to cross Lakeview VOR at 6,000 feet.

**EXAMPLE-**

"United Four Seventeen, descend now to flight level two seven zero, cross Lakeview V-O-R at or below one zero thousand, descend and maintain six thousand."

**NOTE-**

The pilot is expected to promptly execute and complete descent to FL 270 upon receipt of the clearance. After reaching FL 270, the pilot is authorized to descend "at pilot's discretion" until reaching Lakeview VOR. The pilot must comply with the clearance provision to cross Lakeview VOR at or below 10,000 feet. After Lakeview VOR, the pilot is expected to descend at the rates specified in the AIM until reaching 6,000 feet.

**NOTE-**

1. A descent clearance which specifies a crossing altitude authorizes descent at pilot's discretion for that portion of the flight to which the crossing altitude restriction applies.

2. Any other time that authorization to descend at pilot's discretion is intended, it must be specifically stated by the controller.

3. The pilot may need to know of any future restrictions that might affect the descent, including those that may be issued in another sector, in order to properly plan a descent at pilot's discretion.

4. Controllers need to be aware that the descent rates in the AIM are only suggested and aircraft will not always descend at those rates.

**REFERENCE-**

P/CG Term- Pilot's Discretion.

e. When a portion of a climb/descent may be authorized at the pilot's discretion, specify the altitude the aircraft must climb/descent to followed by the altitude to maintain at the pilot's discretion.

**PHRASEOLOGY-**

CLIMB/DESCEND NOW TO (altitude), THEN CLIMB/DESCEND AT PILOT'S DISCRETION MAINTAIN (altitude).

**EXAMPLE-**

"United Three Ten, descend now to flight level two eight zero, then descend at pilot's discretion maintain flight level two four zero."

**NOTE-**

1. The pilot is expected to commence descent upon receipt of the clearance and to descend at the suggested rates specified in the AIM, para 4-4-9, Adherence to Clearance, until reaching FL 280. At that point, the pilot is authorized to continue descent to FL 240 within the context of the term "at pilot's discretion" as described in the AIM.

2. Controllers need to be aware that the descent rates in the AIM are only suggested and aircraft will not always descend at those rates.

f. When the "pilot's discretion" portion of a climb/descent clearance is being canceled by assigning a new altitude, inform the pilot that the new altitude is an "amended altitude."

**EXAMPLE-**

"American Eighty Three, amend altitude, descend and maintain Flight Level two six zero."

**NOTE-**

American Eighty Three, at FL 280, has been cleared to descend at pilot's discretion to FL 240. Subsequently, the altitude assignment is changed to FL 260. Therefore, pilot's discretion is no longer authorized.

g. Altitude assignments involving more than one altitude.

**PHRASEOLOGY-**

MAINTAIN BLOCK (altitude) THROUGH (altitude).

h. Instructions to vertically navigate on a STAR/FMPS with published restrictions.

**PHRASEOLOGY-**

DESCEND VIA (STAR/FMSP name and number).

**EXAMPLE-**

"Descend via the Mudde One Arrival."

"Cross JCT at flight level two four zero, then descend via the Coast Two Arrival."

**NOTE-**

Clearance to "descend via" authorizes a pilot's discretion descent to comply with published altitude and/or speed crossing restrictions. "Expect" altitudes/speeds are not considered STAR/FMSP crossing restrictions until verbally issued by ATC. They should be used only for planning purposes and should not be used in the event of lost communications, unless ATC has specifically advised the pilot to expect these altitudes/speeds as part of a further clearance.

**REFERENCE-**

14 CFR Section 91.185(c)(2)(iii)

1. If it is necessary to assign a crossing altitude which differs from the STAR/FMSP altitude, emphasize the change to the pilot.

**PHRASEOLOGY-**

DESCEND VIA THE (STAR/FMSP) ARRIVAL EXCEPT (revised altitude information).

**REFERENCE-**

FAAO 7110.65 Clearance Information, Para 4-7-1.

AIM, Standard Terminal Arrival (STAR), Flight Management System Procedures (FMSP) For Arrivals, Para 5-4-1.

i. When a pilot is unable to accept a clearance, issue revised instructions to ensure positive control and standard separation.

**NOTE-**

1. 14 CFR Section 91.123 states that a pilot is not allowed to deviate from an ATC clearance "that has been obtained... unless an amended clearance is obtained" (except when an emergency exists).

2. A pilot is therefore expected to advise the controller if a clearance cannot be accepted when the clearance is issued. "We will try" and other such acknowledgements do not constitute pilot acceptance of an ATC clearance.

3. Controllers are expected to issue ATC clearances which conform with normal operational capabilities for each aircraft and do not require "last minute" amendments to ensure standard separation.

4. "Expedite" is not to be used in lieu of appropriate restrictions to ensure separation.

**REFERENCE-**

FAAO 7110.65, Providing Assistance, Para 10-1-3.

**4-5-8. ANTICIPATED ALTITUDE CHANGES**

If practicable, inform an aircraft when to expect climb or descent clearance or to request altitude change from another facility.

**PHRASEOLOGY-**

**EXPECT HIGHER/LOWER IN** (number of miles or minutes) **MILES/MINUTES**,

or

**AT** (fix), **REQUEST ALTITUDE/FLIGHT LEVEL CHANGE FROM** (name of facility).

If required,

**AT** (time, fix, or altitude).

**REFERENCE-**

FAAO 7110.65, IFR Flight Progress Data, Para 2-2-6.

**4-5-9. ALTITUDE CONFIRMATION- NONRADAR**

a. Request a pilot to confirm assigned altitude on initial contact and when position reports are received unless:

**NOTE-**

For the purpose of this paragraph, "initial contact" means a pilot's first radio contact with each sector/position.

1. The pilot states the assigned altitude, or

2. You assign a new altitude to a climbing or descending aircraft, or

3. **TERMINAL**. The aircraft was transferred to you from another sector/position within your facility (intrafacility).

**PHRASEOLOGY-**

(In level flight situations),

**VERIFY AT** (altitude/flight level).

(In climbing/descending situations),

(if aircraft has been assigned an altitude below the lowest useable flight level),

**VERIFY ASSIGNED ALTITUDE** (altitude).

(If aircraft has been assigned a flight level at or above the lowest useable flight level),

**VERIFY ASSIGNED FLIGHT LEVEL** (flight level).

b. **USA**. Reconfirm all pilot altitude read backs.

**PHRASEOLOGY-**

(If altitude read back is correct),

**AFFIRMATIVE** (altitude).

(If altitude read back is not correct),

**NEGATIVE. CLIMB/DESCEND AND MAINTAIN** (altitude),

or

**NEGATIVE. MAINTAIN** (altitude).